

Name: _____

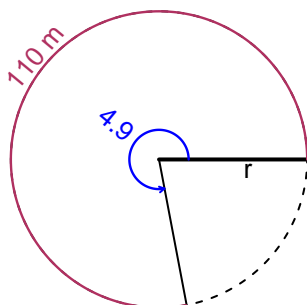
Date: _____

Trig Final (SLTN v694)

- You should have a calculator (like [Desmos](#)) and a [unit-circle](#) reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The angle measure is 4.9 radians. The arc length is 110 meters. How long is the radius in meters?

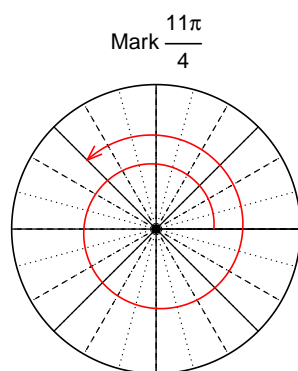


$$\theta = \frac{L}{r} \quad r = \frac{L}{\theta} \quad L = r\theta$$

$r = 22.45$ meters.

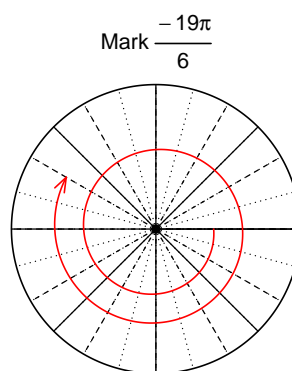
Question 2

Consider angles $\frac{11\pi}{4}$ and $-\frac{19\pi}{6}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(\frac{11\pi}{4}\right)$ and $\sin\left(-\frac{19\pi}{6}\right)$ by using a unit circle (provided separately).



Find $\cos(11\pi/4)$

$$\cos(11\pi/4) = \frac{-\sqrt{2}}{2}$$



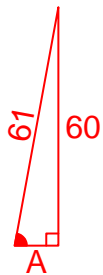
Find $\sin(-19\pi/6)$

$$\sin(-19\pi/6) = \frac{1}{2}$$

Question 3

If $\sin(\theta) = \frac{60}{61}$, and θ is in quadrant II, determine an exact value for $\cos(\theta)$.

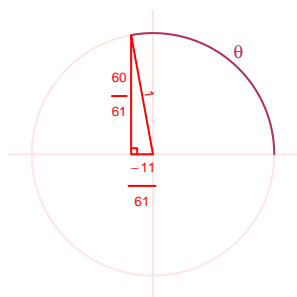
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$\begin{aligned}A^2 + 60^2 &= 61^2 \\A &= \sqrt{61^2 - 60^2} \\A &= 11\end{aligned}$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant II in a unit circle.



$$\cos(\theta) = \frac{-11}{61}$$

Question 4

A mass-spring system oscillates vertically with a frequency of 4.32 Hz, a midline at $y = 2.88$ meters, and an amplitude of 5.55 meters. At $t = 0$, the mass is at the midline and moving up. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 5.55 \sin(2\pi 4.32t) + 2.88$$

or

$$y = 5.55 \sin(8.64\pi t) + 2.88$$

or

$$y = 5.55 \sin(27.14t) + 2.88$$